

*vice versa*, and that these variable, intermediate, and unstable states had sprung from acorns thus crossed. And this is the consideration which I wished specially to emphasize. It is often and truly said that persons unfamiliar with any special branch of natural science are incapable of appreciating the nature and force of scientific convictions. This would be pre eminently true in this case. Standing in the presence of these forest denizens, I felt that they were speaking to me and revealing to me the secret of their conception, birth and life, in a language more potent and convincing than any words or voice could make it.—LESTER F. WARD.

TIMBER LINE IN THE SAWATCH RANGE.—That part of the main range of the Rocky Mountains known as the Sawatch Range has a general north and south direction with spurs running east and west between which the different streams find their way into the Arkansas or Gunnison Rivers.

The direction of the spurs and range is important, as by it the height of the tree line is in great part determined.

Timber line is generally at an altitude of nearly 12,000 feet above sea level, but in some localities may be lower than 11,000 feet. *Picea Engelmanni* forms the great mass of the forest at high altitudes, sometimes *Pinus aristata* is quite plenty and in some places there are a few trees of *Pinus flexilis* and rarely the Aspen comes to be a member of the high alpine woods.

Close to timber line are found the largest trees and most magnificent forests of Engelmann's Spruce and there is not the gradual decrease of size and vigor that the cold of an arctic climate should cause.

A few steps and one passes from a dense forest to a treeless region extending to the summits.

Engelmann's Spruce will not grow on the rocky slides so common in the Rocky Mountains, nor in a very wet location, but an excess of moisture does not influence the altitude of timber line.

Most of the summits of the very high peaks, such as Antero, Ouray and Princeton, are nearly clean rock, surrounded by "slides," and their tree line is determined by conditions of soil; and many of the lesser peaks also have an apparent tree limit caused only by rocky summits.

The scattered trees finding a foot hold on the steep sides of such peaks, not having the protection against the elements, that in a forest one tree gives to another do not grow at as high an altitude as the soil would permit. The main agents in preventing the forest from crossing the "divides" are the snow and wind.

Some idea of the power of snow at high altitudes may be imagined by noticing the paths of the "snow slides," or avalanches, swept clean of trees from the summit to the base. At one place near Mt. Antero, where an avalanche had come down, the trees from the mountain side were piled up twenty feet high for a distance of five hundred feet. Near tree line, where there has been no downward

movement of large masses of snow, I have seen trees six feet high torn up by the drifts. Large drifts are generally formed near the summits of steep banks about timber line and easily prevent trees obtaining a foot hold upon the steeper slopes. If such a slope at its summit has a comparatively level area protected by a higher summit some distance beyond, there will be a sort of double timber line, one at the foot of the bank and one some distance beyond its summit, but the upper one is formed by trees, almost prostrate, bent and twisted downward and distorted into all manner of shapes by the weight of the snow. They owe their existence to the nearly level habitat which prevents them from being torn up by a downward motion of the snow. Without a higher protecting ridge this second timber line would be impossible on account of the winds which would keep the summit clear of trees.

The prevailing winds are from the west from which direction the snow is drifting almost continuously throughout the winter. On almost any clear winter day the banners and streamers of snow can be seen coming from the summits. In consequence of the prevalence of western winds, the largest drifts are on the eastern slope and on the eastern slopes of north and south spurs and timber line is higher on western slopes. This is plainly seen upon the smaller spurs having a north and south direction. If the soil and slope are the same upon both sides, the tree line will round the spur from the western exposure and fall on reaching the eastern slope five or more hundred feet. The wind storms are most violent on the high ridges and divides and prevents the growth of trees in such places, but their direct destructive influence reaches only two or three hundred feet each side of the summit and a lower limit to the forest is due to the drifting snow. Sometimes but rarely a line of prostrate trees between wind and snow can be found, just over the summit out of reach of the wind and not far enough down the slope to enable the drift to obtain a hold and uproot them. *Picea Engelmanni* does not record in its growth the direction of the wind as *Pinus aristata* sometimes does in exposed situations when the twisted and turned branches plainly show that the prevailing winds are from the west. The limit of trees being determined by the winds and the snows drifting about the summits, then timber line depends very much upon the height of the dividing ridge and the higher the mountain the higher the tree line, other conditions being the same.

Timber line reaches its highest altitude where there is a large area of high elevation extending long distances from dividing ridges.—T. S. BRANDEGEE.

NOTES ON SOME CALIFORNIAN PLANTS.—A residence of a year and a half in the Southern part of California, principally in the neighborhood of Los Angeles, has enabled me to study and collect the plants of that region, and I propose giving the readers of the GAZETTE some account of a few of the most interesting features of the vegetation of that locality. I shall select for my purpose only the more